Section 07

Repair Instructions for Special Shutters.

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SYNCHRO-COMPUR 00-MXV CS-1110-556

for Zeiss Ikon AG, Stuttgart

	CN–1110–020	CN–1110–024	CS–1110–556
	Plate		
Cleaning the shutter: as under CN–1110–000			
Lubrication Instructions: as under CN–1110–000 See also Lubrication Schedule CN–1110–000, CN–1110–024 and CN–1110–556			
Assembly and Adjustments: See also plate CN–1110–024 and repair instructions CN–1110–000, points 2, 4–7, 9–11 unchanged.			
Exposure control ring: proper action is ensured by the design. (For replacement see under bayonet retaining ring.)			
Tensioning pinion 517 must be installed so that the first tooth of the tensioning ring lies between the tensioning lug and the first tooth of the tensioning pinion.	3		
Tensioning pinion, tensioning ring and **drive:** as under CN–1110–000, point 3, adjustment "B".			
Blades 208 and their bearings must be absolutely grease-free. The order in which they must be inserted is indicated in the figure by the small numerals 1 to 5.		3	
Diaphragm opening ring 761 must be so positioned that the third tooth from the left points to the centre of the tensioning shaft.			
Coupling 722: When slipping this part on, the tensioning shaft (tensioning pinion) must be supported. The coupling must be pressed on so that there is vertical play on both the housing side and the side towards the shutter mount 745.			
Exposure control ring 539 must be positioned so that the middle one of the three grooves engages the lug of the cam ring 552.			1
Index ring 771: Depress MX lock and insert the detent spring under the setting ring lug. Index ring and housing are fixed relative to each other with groove and pin. After installing the shutter mount **745,** fix the index ring in position with **screws 612.**			1
Setting ring 148 must lie flat, without protruding, in the circular groove of the housing.			1
Follow-up shaft 192: When replacing this part, the vertical play must be checked and adjusted with the **spacers 762** (0.2 and 0.05 mm thick). Vertical play must not exceed 0.07 mm.			2
Shutter mount 745: The diaphragm setting ring **590** must be seated without interstices on the mount and be set so that the red spot between red 10 and 14 lies above the red line on the mount. The rangefinder control cam **775** must be turned clockwise right up to the stop (as seen from inside of mount).			1
Check functioning of levers (see Fig.). The "A" setting lever **657** must lie against the follow-up lever **192** and both must lie in the same plane.			2
When setting the mount in place, first insert the contact strip, then the tensioning shaft. The mount must lie against the index ring **771** without any interstice. If this is not the case, the diaphragm setting ring coupling (at "A") must be depressed and the diaphragm setting ring **590** turned slightly until the mount is properly seated. In this position the shutter must be held firm and the tensioning shaft actuated. Fix shutter mount firmly in place with **screws 753.**			2
Check: When the shutter is tensioned, diaphragm and blades must clear the shutter aperture completely. The tensioning shaft must run back automatically and trip the shutter. When the rangefinder control cam **775** is actuated, the diaphragm must close step by step.			

If the shutter mount is replaced, the lens focus must be checked and, if necessary, readjusted in accordance with the camera manufacturer's instructions.

CS–1110–556
Plate

When replacing the shutter mount **745**, the rangefinder control cam **775** or the follow-up shaft **192**, the position of the rangefinder control cam lug **775** must be checked and the lug of the **rangefinder lever 776** adjusted so that the rangefinder control cam is positioned as described below.

It is advisable to adopt the following procedure:

(a) set the diaphragm setting ring at light value 40 and turn the rangefinder control cam clockwise (as seen from rear) as far as it will go.

(b) Tension and trip shutter.

(c) Turn rangefinder control cam **775** back again until the diaphragm lock **765** engages in the marked tooth gap of the diaphragm ring **108** (corresponds to f/16). The centre of the rangefinder control cam lug must then, for proper alignment, be at an angle of 111° 35' ± 35' (corresponds to a range of 2.65 m).

If the deviation is greater than ± 35', the rangefinder lever lug must be bent as described. 2

Cover plate 540 must be so positioned that the uncovered hole lies over the detent pin **305.** (Plate CN–1110–000/5). 1

Bayonet retaining ring 730: Grease click stop ball and insert in bayonet retaining ring. 1
Check position of exposure setting ring.

The bayonet retaining ring and the housing are fixed relative to each other with pin and groove. The lug of the cover plate 536 must lie in the recess of the bayonet retaining ring (must not jam).

Tighten **screws 260** firmly to hold bayonet retaining ring in position. 1

Check: When set for "manual" or light values, the exposure control ring must rotate from 500 to "B".

When replacing the bayonet retaining ring, the following truing operations must be carried out.

For interchangeable front components, the distance between the face of the tube and the lens seating of the bayonet retaining ring is 3.0 — 0.02 mm (see dimension sketch of Specifications 1110–020, dimensions 16, 15 and 3.0 mm). Truing is carried out by turning out the lens seating of the bayonet ring while it is firmly screwed into the shutter. In addition, the centering diameter must be enlarged by turning to 35.8 + 0.015 mm (for checking see "Concentricity and Planar Trueness Test").

During truing special care must be taken to ensure that no chips reach the blades or the inside of the shutter (cover carefully).

If you are unable to do the turning work yourself, we will gladly carry out the repair. In such case, please send us the entire shutter.

Concentricity and Planar Trueness Test

Concentricity: Maximum eccentricity between mounting tube **204** and housing **101**: 0.01 mm. Maximum eccentricity between mounting tube **204** and 35.8 mm centering diameter of the bayonet retaining ring **730**: 0.01 mm.

Planar Trueness: Maximum wobble between camera seating of shutter mount **745** and lens seating of housing **101**: 0.03 mm.

Maximum wobble between lens seating of housing and lens seating of mounting tube **204**: 0.015 mm.

Maximum wobble between lens seating of mounting tube and lens seating of bayonet retaining ring **730**: 0.015 mm.

Cleaning the shutter:

SYNCHRO-COMPUR 0-MXV CS-1210-671 to CS-1210-678

for Linhof, Munich

Cleaning the shutter:	As under CN–1110–000
Lubricating Instructions:	As under CN–1110–000 See also Lubrication Schedules CN–1110–000 and CS–1210–671
Assembly and Adjustments:	See plates CS–1210–671, CN–1110–022 and CN–1110–000; Repair Instructions CN–1110–000, points 2 and 5 to 11 unchanged

Tensioning pinion 523, Tensioning Ring 528, Bridge 621 with locking lever and **Sleeve 746** -- see **Repair Instructions CN–1210–022.** CS-1210-671 Plate

Rocker 040 is seated on the pivot of the diaphragm ring 108. Between the rear of the shutter mount and the rocker is the **spacer 733.** The rocker is guided by the cam ring 020 and the smaller pin engages in the slot of the indicator ring **034.** 2

Indicator Rings 032 and **034** are positioned symmetrically to the range indicator. 2

Friction ring 594 with **Spring 595** must snap evenly into and lie flat in the diaphragm setting ring **590.**
The friction ring must then be turned so that when the smallest stop is set the fourth tooth from the right is aligned with the index mark of the shutter mount 745. 1

Flanged Ring 815 and **sleeve 746** are fixed relative to each other by a groove and pin (long). The flanged ring must engage the friction ring. 1

Lock ring 567 must be snapped into position so that the gap in the ring lies opposite the cam ring lobe (protruding lobe). 1

Exposure control ring 539: Turn the cam ring anticlockwise to the stop ("B" setting) and set the diaphragm at the smallest f-stop. Insert both balls.
Position exposure control ring so that the cam ring lug lies in the groove of the exposure control ring. The ball must then engage in the first click stop notch. 1

Retaining ring 058 must be positioned so that the depression on the lower side of the ring lies above the click stop ball. Fasten by tightening screws **059** firmly. 1

Concentricity and Planar Trueness Test

Concentricity: Maximum eccentricity between the mount **745** and sleeve **746:** 0.015 mm.

Planar Trueness: Maximum wobble between lens seating of mount and lens seating of sleeve: 0.015 mm.

SYNCHRO-COMPUR 0-MXV CS 1210-660

with blade opening mechanism and carrier mount

Cleaning the Shutter:	As under CN–1110–000
Lubricating Instructions:	As under CN–1110–000 See lubrication schedules CN–1110–000
Assembly and Adjustments:	See Plates CS–1210–660, CN–1210–051 and CN–1110–000, Repair Instructions CN–1210–051 and CN–1110–000.

The **exposure control ring 583** and **driver ring 575** are fastened to each other by the driver screw **579.** The first step in disassambly is the removal of this screw. It is also advisable to remove screw **584.**

CS-1210-660
Plate
1

The exposure control ring must be seated in the driver ring without any play. If necessary, the snap catch must be adjusted with screw **584.**

When inserting the complete shutter into the **mount body 020,** it must be ensured that the shutter mounting screw (at the rear of the shutter) lies in the groove of the mount.

Screw-on ring 102 must be tightened firmly.

COMPUR 000-X CS-1914-102

for the Agfa-Gevaert AG Munich

Cleaning the Shutters	as under CN—1914—000
Lubricating Instructions:	as under CN—1914—000 See Lubrication Schedule CN—1914—000
Assembly and Adjustments:	See Plates CN—1914—000 Repair Instructions CN—1914—000 Points 1 to 4 and 6 unchanged

CN—1914—102
Plate

1. **Range Scale 027** and **Shutter Speed Setting Member 539**

2. **Range Scale 028** and **Diaphragm Setting Member 590**

   In both cases the range scales and setting members are fixed in position relative to each other (see Fig. 2). The range scales must lie snugly against the setting members. When inserting the setting members in the **cover cap 540**, care must be taken to ensure that the shutter speed setting member lies on the bottom of the cap and that the recess of the diaphragm setting member lies in the vicinity of the diaphragm setting member lug. Check functioning and stop engagement of the setting members after insertion in the casing. 1

3. **Knobs 177** are pressed on to the setting members.

4. **Casing 101** and cover cap 540 are fixed in position relative to each other by a lug in the cover cap and a groove in the edge of the casing on the one hand, and by a locking pin in the base plate and a hole in the cover cap on the other. 1

5. **Functioning of the completely assembled shutter**

   At Setting "A": The diaphragm ring **108** is pressed against the lug of the slotted cam ring **552** by the spring **578.** This involves no change in the association of shutter speeds and f-stops. 2

Shutter speed	31.25	12.40	4.92	2.90	1.95	1.95
ta in ms[1]	32.6	13.19	5.34	3.18	2.16	2.08
f-stop	2.8	4	5.6	6.9	8	11.
Aperture check diam.[2]	8.16	5.78	4.08	3.35	2.89	2.037
Light value	8	10.3	12.7	14	15	16

   At Setting ⚡ (flash) the shutter speed is 1/30 s. The f-stop can be freely selected.

   At Setting "B": The shutter can be kept open in the usual manner for any desired length of time. The f-stop can be freely selected.

6. **Escapement Assembly:** As under CN—1914—000, Point 5.

7. **Escapement Adjustment:** By turning the eccentric. Adjustments should preferably be made with the completely assembled shutter at Setting "A". The cover plate **546** above the eccentric must be removed beforehand. The slotted cam ring positions for the various shutter speeds can either be seen from Fig. 1 or be determined by means of the check diameter of the aperture (see above table).

[1] ta = axial time (measured through middle of shutter, light pencil diam. = 0.5 mm)
[2] Check diam. = diam. of inner circle of pentagon.

COMPUR 000-X CS 1919-301

for the Kodak AG, Stuttgart

Cleaning the Shutter:	as under CN–1914–000	
Lubricating Instructions:	as under CN–1914–000 See Lubrication Schedule CN–1914–000	
Assembly and Adjustments:	See Plates CN–1914–000 Repair Instructions CN–1914–000 Point 1 to 6 unchanged	CN–1914–301 Plate

1. **Click stop lever 584** is pressed against **exposure control ring 535** by the spring **585;** (Click stop for "B", see Fig. 2). 1

2. **Slotted cam ring 552** and **exposure control ring 539** are fixed in position relative to each other by lug and groove. 1

3. **Shutter speed setting shaft 219:** Insert at Setting "B". The driver pin 545 must be placed in the position shown in Fig. 1. 1

SYNCHRO-COMPUR 00-XV CS-1112-455

for Messrs. Voigtländer, Braunschweig

Cleaning of shutter: as under CN–1110–000

Lubricating instructions: as under CN–1110–000
see also lubrication charts CN–1110–000 and CN–1110–034/035

CS–1112–455 CS–1110–035
plate

Assembly and adjustment:

See also picture plates CN–1110–035 and CN–1110–000

Items 2, 5, 6 and 7 unchanged as under CN–1110–000

Tensioning pinion, tensioning ring and drive: as under CN–1110–000, item 3, "B"-type adjustment.

Insert the tensioning pinion so that the first tooth of the tensioning ring engages the first tooth space of the pinion. 2

Bridge 621 and locking lever 569: As the opening pin snaps back in the blade ring 202, the locking lever must lock the reverse motion of the drive 514. In the design used, this motion is ensured even after replacement of parts. 1

When bridge 621 or tensioning ring 528 have been replaced, a check must be made of shutter triggering. If necessary, bend the adjusting member of the locking lever so that shortly before reaching its neutral position the tensioning ring swings out the locking lever far enough to ensure definite release of the drive.

Blades 208, 267 and 268 and their bearings must be completely free from grease. The sequence of assembly is shown by the small numerals 1 to 6 in the illustration. The second of the blades 267 has a recess accommodating the tensioning shaft.

Tensioning ring lock 269: After replacement of this part, check the release of the tensioning ring with the aid of the camera. If necessary, adjust the lug of part 269. 2

Opening disk 801, pawl **802** and blade ring **202:** When the shutter is tensioned, the rear opening pin of the blade ring must push the pawl back about 0.1 mm. If one of the parts 801, 802 or 202 is replaced, this function must be checked and, if necessary, the opening pin bent accordingly. 2

Smoothness of operation and the click-stop positions of the speed selector ring 539 are invariable due to the design used. After replacement of the bayonet retaining ring 730 the ball stop may, if necessary, be adjusted so as to ensure perfect engagement of the cam ring 552 combined with smooth operation of the speed selector ring. 1 a 2

Bayonet retaining ring 730: Before inserting this part, set the cam ring to "B" (Fig. 3) and place the ball greased with lubricant A on the ball stop spring. 3

	CS–1112–455 plate	CS–1110–035
The bayonet retaining ring and the shutter are fixed relative to each other with pin and groove (Fig. 3).		3
Position the **pinion 757** so that the collar of the shaft runs in its countersink.	1	
When the shutter is inserted, the pinion **757** must engage the teeth of the tensioning ring (Fig. 4).		3
Secure screws **260** tightly.	1	
Speed selector ring 539 and **cam ring 552; diaphragm coupling ring 590** and **friction ring 594** are fixed relative to each other with groove and lug.	1	3
Before mounting the friction ring, grease the click stop ball (and the click stops of the outer cover ring 738) heavily with lubricant A.		
Insert the **lock spring 595** and check operation of the diaphragm coupling ring 590 over the entire aperture range. If necessary, correct the initial tension of the spring.	1	
Insert the **diaphragm opening ring 761** into the diaphragm cover ring so that the third tooth space points to the shaft of the pinion (Fig. 1).	1	
Outer cover ring 738: Before positioning the completely mounted outer cover ring on the shutter turn the setscrews **822** in the bayonet retaining ring 730 back all the way. The shutter speed setting is of no consequence for mounting the outer cover ring.	1	
Tighten screws **739** firmly.	1	
Setscrews 822: These screws serve to adjust the vertical play of the speed selector ring 539. Vertical play must not exceed 0.15 mm over the entire range of motion.	1	

Concentricity and planar trueness test:

Concentricity: Maximum eccentricity between bayonet retaining ring 730 (centering diameter for quick-change mount) and outer cover ring 738 (inside diameter): 0.07 mm

Planar trueness: Bayonet retaining ring 730: Maximum wobble between seating face of quick-change mount and camera flange: 0.02 mm.

COMPUR 000-X-Reflex CS-1912-206

for Messrs. Rollei-Werke, Brunswick

Cleaning of shutter: Same as under CN–1914–000

Lubricating instructions: see lubricating chart CS–1912–206

The necessary lubricants (A and C) and the oil PDP 38 can be ordered from us. Other lubricants should not be used, as only those tested in our factory will ensure proper functioning of shutters. Distribute the prescribed lubricant on a glass plate and carefully apply it to required point with the aid of a fine brush or a foam rubber swab. The lubricant should be stirred briskly before use.

Dip the well-cleaned parts in this mixture and leave them to dry on clean blotting paper. The remaining oil film is sufficient for lubrication. Any drops in holes or in the teeth of gears must be removed (by blowing).

If the escapement was cleaned without disassembly, the bearings of the gears and detent must be lightly lubricated with PDP 38. Then remove any traces of oil from the plates, particularly from the underside of the lower plate 302, by means of a soft rag. If necessary, lightly lubricate the gear teeth with the oil mixture using a brush. Take care to avoid the formation of oil drops.

Assembly and adjustment:	CS-1912-206 Plate
1. The **aperture selector ring 590** and the **engraving strip 591** as well as the **film speed ring 576** and the **engraving strip 541** are fixed relative to each other by a lug and groove.	2
2. **Film speed ring 576** or **cam ring 552.** The torque (stiffness) of the film speed ring is determined by the force of the spring lug of the cam ring. If necessary, readjust the torque by bending the spring lug.	1 and 2
3. **Supporting plate 174.** If this or the blade opening ring **252** is exchanged, it is necessary to check the trapping position. The gap between the lug of the blade opening ring and the detent lever must at least be 0.05 to 0.1 mm. For adjustment, use the eccentric (Fig. 1).	2 5
The diaphragm opening ring **761** must reliably swing out the detent lever far enough for the blade opening ring **252** to open the blades fully. The detent lever must be reliably reset by the spring **245.**	2
4. **Locking lever 661.** If the drive **514** or the locking lever have to be replaced, it is necessary to check the engagement of the locking lever: The locking lever must engage its counterpart simultaneously with the thrust pawl (514) or slightly later (0° to 1° 30' as measured at the tensioning shaft). If this is not the case, select another locking lever from among the six different types that are available (see also Note 90).	4
5. **Synchronization:**	4
Contact clearance: approx. 1.0 mm (see Fig. 2) Contact pressure: min. 35 g (see Fig. 3)	
The blade ring **202** must be in open position. In addition, the contact spring **606** must be adjusted so that contact is made when the tips of the blades lie between an aperture diameter of at least 10 mm (full shutter aperture = 12 mm dia.).	5 4
6. Insert the **escapement 300** into the tensioned shutter, push it inside and lightly fix it with the screws **304** and **312.** In this position the effect of the escapement is greatest (slowest speed $^1/_2$ sec).	3
Speed adjustment - Fig. 2 - (with cam ring 552 in position)	
$^1/_2$ sec: From the above position rotate the escapement uniformly outwards (towards the shutter edge) about the screw **312** until the speed is within the prescribed tolerance. Tighten both screws firmly.	

CS-1912-206
Plate

$^1/_{15}$ sec: Bend the pin of the low-speed detent **305** (Fig. 1). 3

$^1/_{250}$ sec: Bend the pin of the high-speed detent **341** (Fig. 1).

$^1/_{500}$ sec: The drive must not come into contact with the high-speed detent during operation. If necessary, readjust the $^1/_{250}$ sec.

Shutter speeds: Perform measurement with adjusted and fixed cam ring.

Nominal value	2	4	8	15	30	60	125	250	500
*ta - upper limit of variation	580	291	146	73.4	37.1	19.0	10.96	5.72	3.81
ta - nominal	500	251	126	63.3	32.0	16.40	8.57	4.65	2.70
ta - lower limit of variation	430	216	108	54.4	27.5	14.1	7.37	3.77	1.75

*ta = time on axis (as measured through center of shutter, aperture ~ 0.5 mm dia.)

7. **B-cam 185, blade opening ring 252,** aperture selector ring **590** and diaphragm cover **106.** To facilitate assembly, align these four components as follows: 2 and 5

   Align them with the lug of the opening ring **252.** Then continue alignment so that the guide groove of the selector ring **590,** the control portion of the B-cam and the lug of the diaphragm cover **106** are flush or coincide with the aforementioned lug.

8. The **base plate 201** is mounted in the housing **101**. For **disassembly,** proceed as follows: 5

   Remove the bayonet retaining ring **730** and supporting plate **174.** Hold the shutter with its front facing down and place the edge of the housing on a suitable ring or strip. Loosen the four housing screws **109** and carefully push the base plate out of the housing by tapping on the screws. 1 and 2

   Assembly: Introduce the base plate with the screws **109** into the housing and tighten the four screws crosswise. 5

9. The **blades 208** and their bearings must be completely free from grease. In the illustration, the order of insertion is marked by the figures 1 to 3. It is advisable to insert the blades in "closed position". 5

10. The **spacer 224** is made of thin plastic. Be careful not to damage it during disassembly. For reassembly, the spacer must be completely flat. 5

11. The **thrust pins 120** must be firmly seated in the base plate. After pressing in the pins check the smoothness of operation of the blade ring. 5

12. The **diaphragm blades 105** and their bearings must be completely free from grease. To assemble the diaphragm, proceed as follows: 6

    a) Place the blade cover **116** with the diaphragm side facing up on a support of approx. 25 mm diameter.

    b) Mount the diaphragm blades **105** in "open position". For the order of insertion, see Fig. 1. The blades are seated in the blade cover 116 so that they can be rotated.

    c) Mount the diaphragm cover **106** so that the guide pins of the diaphragm blades engage the guide grooves.

    d) Attach the housing **101.** The housing and the blade cover are fixed relative to each other by a pin and a hole.

    e) Once the diaphragm is assembled, turn the housing round and secure it with the screws **117.**

    f) Check the diaphragm for smooth operation.

13. **Concentricity test:**

    Maximum admissible eccentricity between centering diameter of housing (17.5 mm) and front lens centering flange: 0.08 mm.

    Maximum eccentricity between centering diameter of housing and centering diameter of bayonet mount (39.7 mm): 0.08 mm.

SYNCHRO-COMPUR O-MX CS-1210-277

manufactured for Rollei-Werke of Brunswick

Cleaning:	Same as under CN—1110—000
Lubricating instructions:	Same as under CN—1110—000 In addition, see lubrication schedule CN 1110—000 and CS—1210—277

Assembly and adjustment:

Items 2, 4 and 7 through 11 of the Instructions CN—1110—000 apply without any changes.

CS-1210-000
Plate No.

1. The **stiffness of the speed selector ring** is given by the design. 1

2. **Cam ring 552.** When removing the cam ring, it is advisable to press on the tensioned ring 528 to prevent it from rising and the balls or segments from falling into the shutter (see section on tensioning ring). 4

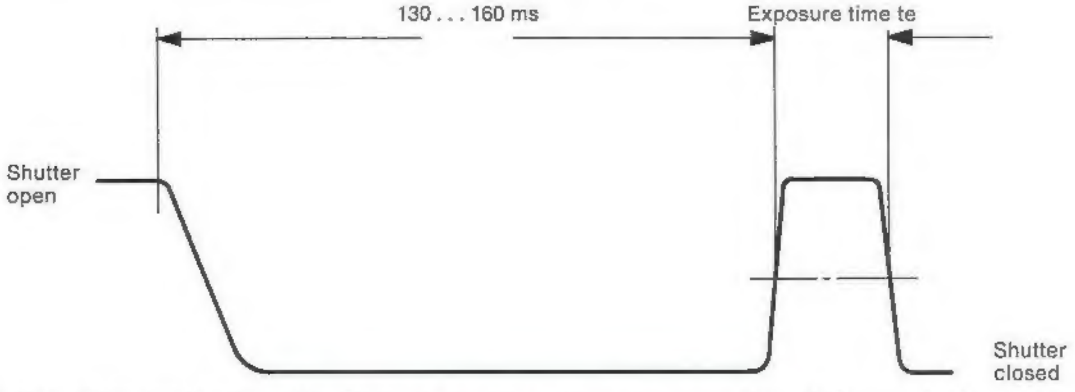
3. The **tensioning ring 528** runs on 15$^1/_{32}$″ balls. These are guided between the plastic segment **222** (Fig. 2). When dismantling the shutter, take care not to drop the balls and the segments into the shutter. It is therefore advisable to turn the shutter upside down when removing the tensioning ring. During reassembly, first grease the groove (mounting tube **204**) with lubricant A. Then insert the segments 222. After inserting the tensioning ring, introduce the balls through the opening in the mounting tube 204 (see arrow in Fig. 2), shifting the segments as required. Then press the tensioning ring down and hook the tension spring **521** into place and insert the pinions 011—522 and 517 (Fig. 1). In order to prevent the tensioning ring from coming loose, immediately mount the cam ring **552** and the lock ring **567.** 5 5 4
   If the tensioning ring is exchanged, observe the instructions given under 4.

4. **Tensioning pinion 517, tensioning ring 528 and drive 514** 5

   If one of these parts is exchanged, check the locking functions of the shutter.

   a) The M-detent should lock simultaneously with or any time before the opening pin locks (see Instructions for repairs No. CN—1110—000, page 1, item 3).

   b) With the shutter tensioned, the tensioning ring 528 should be locked by the tensioning-ring lock 569 and the drive 514 by the locking lever 621. Between the lug of the drive pinion 517 and the drive there must be a clearly visible gap. 5
   This sequence of operations is determined by the width of the lug of the tensioning pinion **517.**
   If necessary, replace the tensioning pinion and/or remachine the lug (see Instructions for repairs No. CN—1110—000, page 1, item 3).



5. **The delay mechanism** (Fig. 3) is designed to delay the operation of the tensioning ring and thus internal shutter tripping by a defined amount. 5

If this value is not reached, replace the anchor **534** and/or the balance wheel **632** or slightly oil them, if necessary.

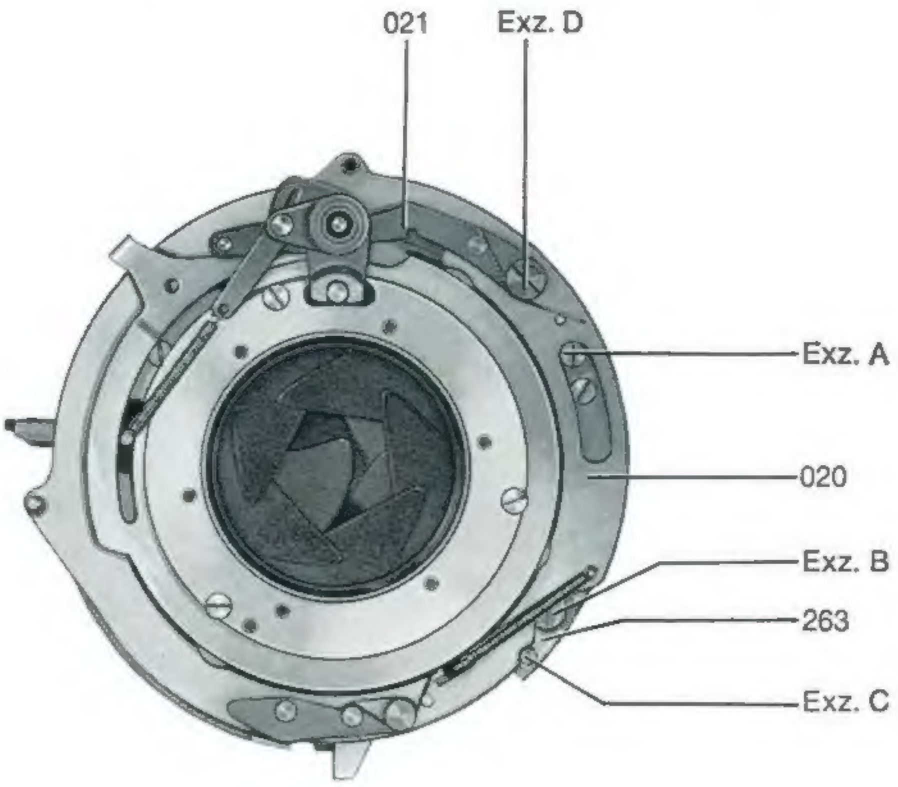
6. Swing the **escapement 681–300** about the screw 304 until it rests against the mounting tube 204. Then tighten the screws **304** and **323.**
   1/500 second (CN–1110–000, plate 9, Fig. 5):
      The cam ring 552 should swing out the escapement lever **341** far enough to allow the drive 514 to operate without any delay. To achieve this, bend the escapement lever accordingly.

   1/125th second: Set this speed by bendind the detent pin (Fig. 4).

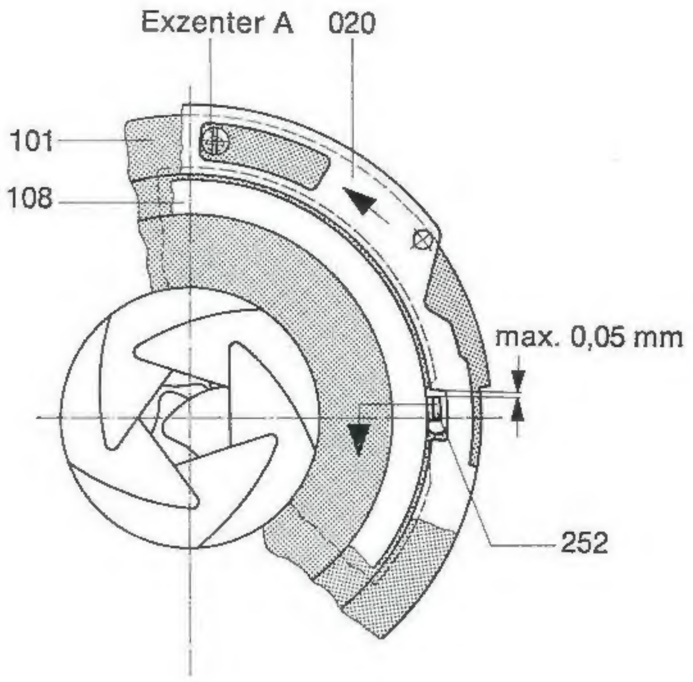
Shutter speeds	30	60	125	250	500
		± 15%		± 25%	

7. **Adjusting the control cam**

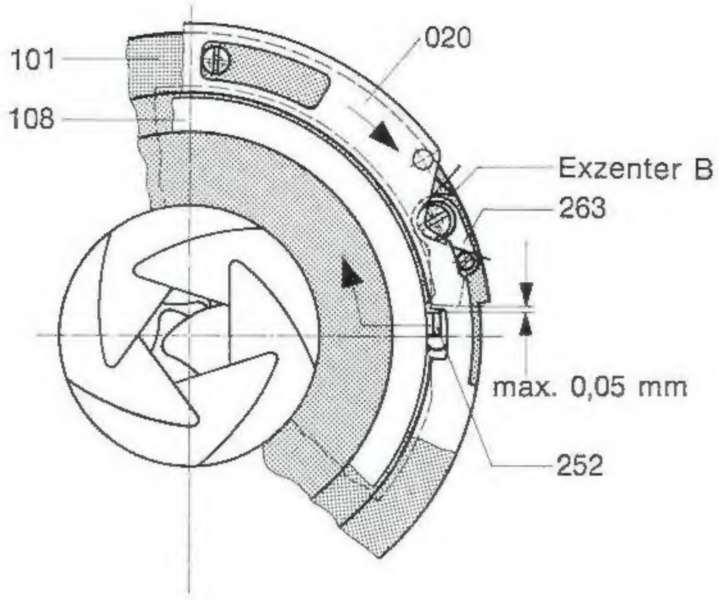
   Check and, if necessary, perform the following adjustments if the control cam **020**, the blade opening ring **252** or the housing **101** was exchanged.



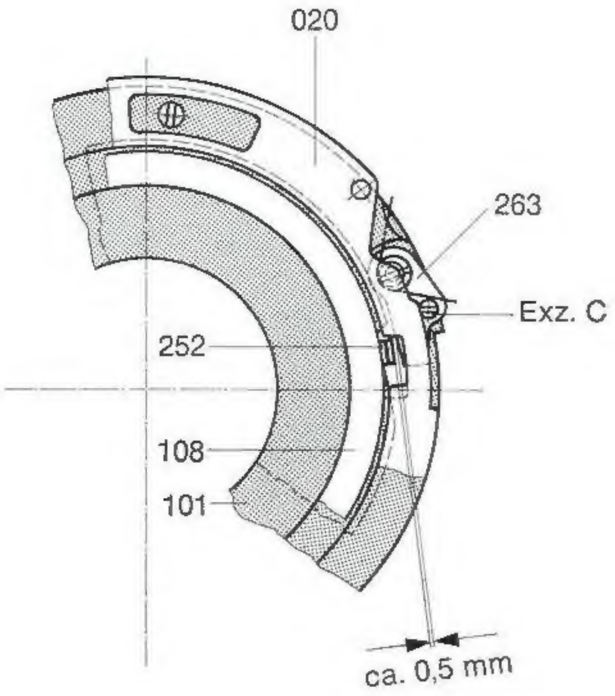
Adjustment of eccentrics:



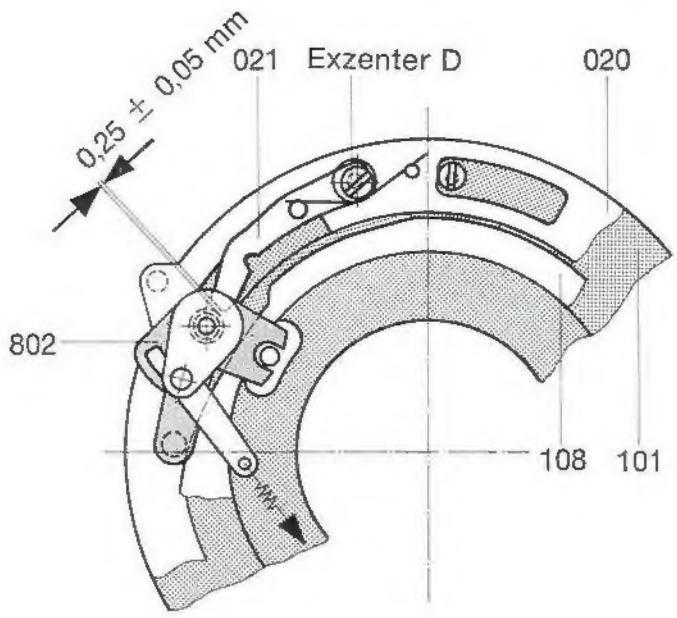
Adjust the blade opening ring 252 (lug) and the control cam 020 for a separation of max. 0.05 mm. During the adjustment keep the blade opening ring in the position corresponding to closed blades and the control cam in contact with the eccentric A.



Adjust the blade opening ring 252 (lug) and the locking lever 263 for the blade opening ring for a max. separation of 0.05 mm. During the adjustment, keep the control cam 020 in contact with the eccentric A and the blade opening lug of the control cam in contact with the spring 264.



Adjust this so that operation of the control cam 020 causes the locking lever 263 to be swung out far enough for the blade opening ring 252 to move unhindered. Experience has shown that this is normally the case when the pawl has dropped about 0.5 mm (thickness of lug) into its counterpart.



Adjust the pawl 021 for the control cam 020 and the meshing face at the bushing of the opening lever 802 for a separation of 0.25 ± 0.05 mm. The control cam 020 should be in contact with the eccentric A.

Plate No.

8. The **spring 445–085** is on the one side hooked into the drive ring 086 and on the other into the pin of the control cam **020.** 3

9. **Intermediate diaphragm ring 037.** During insertion of the shutter (with the shift ring 148) into the shutter mount **745,** the driver **114** must be made to engage the lug of the diaphragm ring **108.** 2

Plate No.

10. **Aperture correction.** If the **aperture selector ring 590** is disconnected from the **intermediate diaphragm ring 037** by loosening the three screws **592**, the aperture diameter must subsequently be readapted as follows: 2

    1. Turn the aperture selector ring 590 so that it engages in the f/4 position (first click stop).
    2. Set the intermediate diaphragm ring 037 so that the interior edges of the diaphragm blades are just tangent to the test diameter. For the latter, the following values are applicable:
       Distagon 4/80: 22.90 mm.
       Sonnar 4/150: 24.00 mm.
    3. Retighten the screws 592.

11. **Mounting the sleeve 746**

    1. Before attaching the sleeve 746 to the shutter, move the "set" indicator **032**, the tensioning segment **830** and the MX-selector **685** into the position shown in Fig. 1. 2
    2. Shift ring **148:** The flat tang for the MX-selector 685 should be located in the center of the cutout in the shutter mount. 3
    3. Hook the spring **829** into the screw **826** (shutter mount) and thread the two control leads the sleeve. 1 and 2
    4. Place the sleeve loosely on the shutter. Insert the spring 595 and the ball (greased) for the MX-detent into 2 the shutter mount. 2
    5. Test: With the sleeve in proper position,
       a) the MX-selector 685 must have engaged the shiftring lug 148 and stop in detent positions at either end.
       b) Tensioning of the shutter by means of the tensioning segment 830 must be possible. After tensioning, the tensioning segment must automatically return to its initial position.
       c) With the tensioning segment in tensioned position, the green dot of the "set" indicator **032** must be visible in the window of the sleeve. 2

12. The **speed selector ring 539** is coupled with the cam ring 552 through the driver 575. 1

13. **Flash terminal**

    When soldering the flash leads, take care to ensure correct polarity. 1

14. **Concentricity and planar trueness test**

    It is advisable to remove the outer cover ring **738** for this purpose: 1

    Concentricity: Maximum eccentricity between mating surfaces of shutter mount 745 sleeve 746: 0.015 mm.

    Planar trueness: Maximum wobble between lens seating face of shutter mount 745 and lens seating face of sleeve 746: 0.015 mm.